the adoption of a suitable dietary regimen and the employment of therapeutic measures somewhat simpler than the intravenous administration of glucose.

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CAVINS DETER HART, M. D. (380 Post Street, San Francisco)—Doctor Lewis is to be commended for his research in a subject that today is being so extensively investigated in the attempt to relieve the pregnant patient of one of her most distressing complications.

My experience in the use of glucose with insulin in the vomiting of pregnancy has been limited, as I have felt that we were dealing with a deficiency in the carbohydrates rather than with an inability of the nondiabetic patient to utilize the sugars. Titus has been one of the early advocates of this theory and finds no use for the insulin in the early or late toxemias of pregnancy except where large amounts of glucose are used.

There are two objections to the intravenous use of glucose in the mild vomiting cases. The first objection is that most of these cases will respond to rest and proper dietary routine. The education of the young women of today is helping a great deal, as they no longer consider nausea and vomiting necessary. They consult their medical advisers early, and we no longer see so many neglected severe cases. The second objection is the destruction of the veins by thrombosis which so often occurs after glucose therapy.

In the severe cases of vomiting in pregnancy intravenous glucose therapy is indicated. Titus does not use insulin in these cases. Dieckmann and Crossen use it only in cases where large quantities of glucose are given intravenously. The last two investigators feel that large quantities of fluids are most essential. They recommend 1500 to 3000 cc. of Ringer's solution intravenously and 1000 to 2000 cc. of 10 per cent glucose intravenously in a period of twenty-four hours. The fluids are used to establish diuresis and the glucose is given for food.

My most satisfactory results in the severe cases have been obtained by giving a liter of 10 per cent glucose twice daily until diuresis is well established and the vomiting has ceased.

❀

EMIL KRAHULIK, M. D. (1680 Vine Street, Los Angeles)—Nausea and vomiting during the first half of pregnancy divides, according to severity, into three classes: (1) mild, which responds rather promptly to suggestion and a hygienic and dietary regimen; (2) moderately severe; and (3) severe.

Patients coming under the third classification are sufficiently ill to warrant hospitalization and their management is not difficult to outline, whatever its success. Class two is a group of very uncomfortable people to whom we do not bring very much relief. They are able, with effort, to retain food, but they vomit every day and are nauseated almost all of the time. They are not considered ill enough to be confined to bed, or even to require nursing service and yet they are almost totally incapacitated. The satisfactory treatment of the severe cases requires special nursing and entails considerable expense. Therefore it is not practical treatment for the second group.

Doctor Lewis made his suggestion to me some time ago. I have given a daily intravenous injection of 20 cc. of a 50 per cent glucose solution, without insulin, to three patients of the moderately severe type. Instead of being given in the office the injection was given at home, with the patient in bed during the course of the treatment and for one day previously on the usual hygienic and dietary routine. Each received six injections. Encouraging results were not noted. In the last patient the course was repeated using 40 cc. of the glucose solution, and a subcutaneous injection of ten units of insulin. The patient is now three and one-half months pregnant and continues to be nauseated, but vomits less frequently. The procedure is easy and deserves further trials.

In severe hospital cases I have been giving 1000 cc. of a 5 per cent glucose solution, without insulin, by hypodermoclysis with some success. The only advantage of the intravenous method is that more concentrated solutions may be given. Administration by either method must be slow.

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DOCTOR LEWIS (closing)—The discussions of Doctors Slemons, Hart, and Krahulik are exceedingly helpful, and they have touched upon some of the most important considerations of this subject. Since writing the above article I have used this form of treatment in eight other patients and uniformly with good results, except in two patients where the injections were given early and in which there was found no evidence of acidosis. At present I am making the urine tests for acetone and diacetic acids on all such patients and do not institute the insulin and glucose treatment unless these substances are present in the urine. I am more than ever convinced that improvement cannot be expected (as I stated in the last paragraph of my paper) unless there is derangement of carbohydrate metabolism and some evidence of at least beginning acidosis.

RENAL SURGERY: ITS PITFALLS AND COMPLICATIONS*

By CHARLES P. MATHÉ, M. D.
San Francisco

DISCUSSION *by James R. Dillon, M. D., San Francisco; Frank Hinman, M. D., San Francisco; Guy Manson, M. D., Fresno.*

YEARS ago operations upon the kidney were accompanied by an unusually large mortality and often followed by unpleasant complications. An intelligent study and interpretation of renal function has lowered the mortality. Painstaking postoperative care has reduced the number of complications. An analysis of these complications with the purpose of preventing them or of lowering their frequency is of great importance. In reviewing 370 operative renal cases at St. Mary's Hospital, dating back to the fire of 1906, I am enumerating the complications and pitfalls encountered with the purpose of improving the technique in order that such complications may be prevented in the future. The 370 cases reported herein have been consecutive, occurring among several thousand cases seen with kidney lesions. Many which apparently seemed to be operative cases were prevented reaching the operative stage by proper preparation and care. Two hundred and ninety-three of the cases enumerated were operated upon by the author and seventy-seven by other surgeons.

COMPLICATIONS OF RENAL SURGERY

The more common complications encountered in the above series of cases were: shock, 10; hemorrhage, 8; postoperative hemorrhage, 2; cardiac complication, 4; phlebitis, 9; embolus formation, none; fistula discharging urine and pus, 6; anuria, 2; peritonitis, none; pneumonia, 1; pulmonary edema, none; septicemia, 1; cervical neuritis, 1; and abscess of the kidney overlooked at time of operation, 4.

Shock—Surgical shock or exhaustion occurred more often in patients who lost a large amount of blood, after the difficult removal of a large adherent kidney. It was also caused by preoperative fear, worry or insomnia, and was readily rec-

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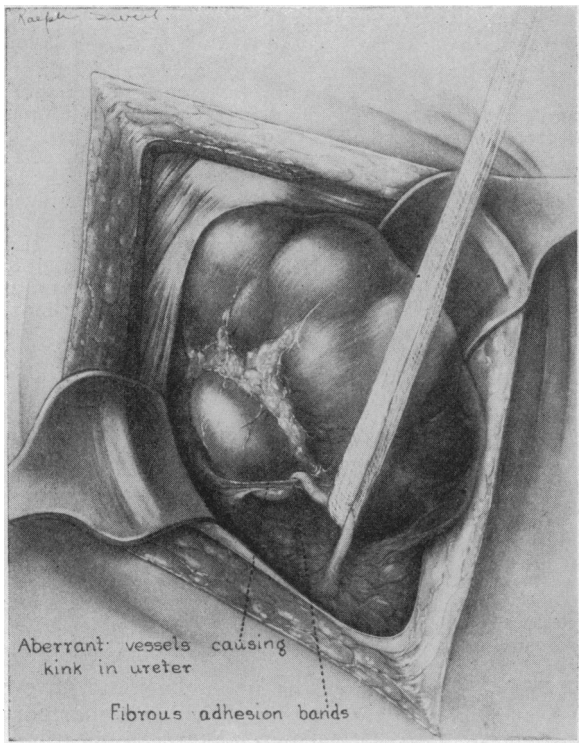

Plate I—Exposure of the lower pole and of an accessory artery obstructing the ureter through careful dissection of the perirenal fat.

ognized by the pulse rate increasing above 120, acceleration of the respiratory rate, a lowering of the blood pressure, pallor, cold extremities, and a profuse sweat. In order to prevent shock, nervous, excitable patients should be encouraged. It is most important that their moral courage be kept high, therefore the gravity and the time of their operations should never be divulged. A difficult nephrectomy can sometimes be made easier by employing the subcapsular method or by removing the kidney in pieces. Rough handling of tissues, excessive retraction and loss of blood can often be avoided by sufficient enlargement of the incision that one can work with ease. When shock occurs during the operation an intravenous infusion of 500 to 1000 cc. of 10 per cent glucose solution is given immediately. For every 3 gm. of injected glucose one unit of insulin is added. (Fisher and Snell). Digalin, 1 cc. every four hours, and caffein 0.12 gm. every four hours are alternately given to support the cardiac system. The operation is terminated as quickly as possible, leaving clamps on the renal pedicle if necessary and closing the wound in one layer.

Hemorrhage—The question of hemorrhage is of great importance. The bleeding time of all patients should be ascertained, and if prolonged they should have previous preparation through the administration of calcium lactate by mouth, calcium chlorid intravenously, or by a transfusion when necessary. During the operation all bleeding points should be securely ligated. The loss of blood should particularly be prevented in children. In opening the kidney parenchyma a silver wire should be employed in place of the hemorrhage-producing scalpel. By the aid of a blunt needle the wire can be slipped in between the larger trunks of the renal vessels, and by a to-and-fro movement the finer ramifications can be actually separated so that only the smaller terminal vessels are severed. During this procedure a rubber clamp should have been previously applied to the pedicle to lessen hemorrhage. We have found a double layer of mattress sutures the best in closing the kidney. It is often our custom to include fat in these sutures to prevent postoperative hemorrhage according to the method of Kolescher and Koll. Whenever possible stones should be removed by a pyelotomy incision, which is practically bloodless if one is careful not to injure, as emphasized by Eisendrath, the posterior artery to the pelvis. One is often surprised at the size of the stone that can be removed in this manner (see plate V). In delivering and freeing the kidney it is best to employ blunt dissection and to be watchful for aberrant vessels, particularly at the upper and lower pole. The pulsating aberrant artery can be readily palpated if a reasonable amount of care is exercised. However, difficulty is often experienced in distinguishing the collapsible aberrant vein from the surrounding fascia. In delivering the kidney, therefore, one should carefully dissect it free from the perirenal fat and fascia and every adhesion should be carefully ligated and investigated under direct vision. Young in discussing Eisendrath's masterful paper on accessory renal vessels delivered before the American Urological Association in 1920, stated that he accidentally cut an aberrant artery of the upper pole in operating on a case of hydronephrosis. The bleeding was stopped by ligation, but the patient ultimately died. It was found afterward that, in attempting to catch the renal vessel that had slipped away, the end of the pancreas had been injured. The integrity of the renal pedicle must be assured. When possible the individual vessels are doubly tied with No. 2 or 3 chromic catgut. If the vessels are matted together and cannot be separated without danger of nicking the vein, they should be tied proximal and distal to the clamp and the stump transfixed. When the pedicle is too short and there is danger of injuring the vena cava, one should not hesitate to leave the clamp *in situ*. In six nephrectomies we were obliged to leave the clamp in place on the renal pedicle and no hemorrhage resulted when it was removed ninety-six hours later.

Phlebitis—Phlebitis occurred in 2.8 per cent of this series of cases. It usually occurs in the internal saphenous vein and does not have predilection for the side of the body on which the kidney is operated. The treatment consists of absolute rest, repeated hot boric compresses, and elevation of the affected member. Quinin given either by mouth or intravenously hastened recovery. Embolus formation did not follow any operation on the kidney. Fatal septicemia due to staphylococcus occurred in one case. A calcified cortical abscess was resected and the kidney suspended in a male, aged 57. Following the operation the pulse and respirations became accelerated, the temperature increased to 102-103 degrees F. accompanied

by acute dilatation of the stomach. In spite of all measures taken to combat these complications the patient became weaker and expired six days after the intervention. As previously emphasized by the author in an article on carbuncle of the kidney, excision and incision of renal abscess and carbuncle have a higher mortality and are followed by more complications than nephrectomy. In performing the latter there is less likelihood of forcing the more or less localized bacteria into the blood stream in large numbers, thus favoring generalized septicemia.

Fistulae—Fistulae discharging urine and pus occurred more frequently prior to 1915 before which time complete urological investigations did not usually antedate the renal operation. It was in most instances due to failure of elimination or back pressure in the lower ureter prior to the operation caused by a stone, stricture or kink of the ureter. In the thirty-two cases of nephrectomy for tuberculosis the wound healed in the average time of ten weeks, whereas in nephrectomy for pyonephrosis the average was three weeks. It was found necessary to repair surgically two broken-down tuberculous wounds. Whenever available the wound is given daily exposures to the morning sunlight, ranging from twenty minutes to three hours in gradually increasing doses. On cloudy days the alpine light was substituted for the sun rays. In highly infected cases the wound is washed out with mercurochrome 1 : 2000. Excessive granulation tissue is curetted away and the base cauterized with nitrate of silver crystals. The injection of a paste consisting of bismuth nitrate 1 gm., iodoform 2 gm., and petrolatum 1 gm., will frequently cause stubborn, reluctant wounds to heal.

Infection of the Renal Fossa—Infection of the renal fossa and perirenal space frequently follows the removal of large pyonephrotic kidneys in which the perirenal tissue was involved. It is not uncommon for these and tuberculous wounds to break down at the anterior angle, or in the middle, about two or three weeks after the operation. Bidgood has recently reported sixteen such cases from the Johns Hopkins Hospital. Thirteen per cent of the tuberculous nephrectomy wounds in this series broke down. Two cases required excision of tuberculous granulation tissue. Another required curettage of the wound, injection of bismuth iodoform paste, and repeated sun exposures before closure was obtained. Infection invariably follows those cases of extravasation of urine. It is very important to drain these cases at the lower as well as the upper end of the incision. In two cases of urinary extravasation following a traumatic and a spontaneous rupture of the kidney it was found necessary later to open up the renal fossa for further drainage which resulted in both cases in a hernia at the site of the incision. Wider primary drainage would probably have prevented this. Early nephrectomy in the acute surgical kidney presenting multiple abscesses, or in kidney carbuncle, not only prevents the infection from involving the other kidney, but arrests the involvement of the perirenal space.

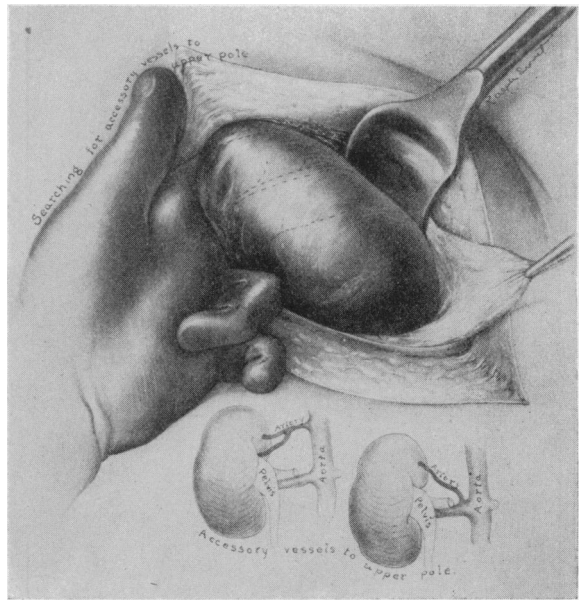

Plate II—When there is difficulty in delivering the upper pole, one should palpate the surrounding tissues for accessory vessels. Accessory veins being collapsible can only be identified by visual exposure of the kidney.

Uremia—Uremia which was the dreaded aftermath of kidney surgery is now a rare complication, thanks to the intelligent employment of the tests of renal function at our command. The increase in the nitrogenous waste products in the blood warns us of the poor operative risk. The phenolsulphonephthalein, indigo carmin and urea function tests assure us that the opposite kidney can carry on the work of elimination of urine during and after the operation. We recently lost a patient from uremia in which the tests ordinarily employed failed us. A nephrectomy was performed on a woman, age 65, for a large infected hydronephrosis secondary to ptosis and to an aberrant vessel. The blood urea was 20 mg. per 100 cc., creatinin 1.5 mg. per 100 cc., and non-protein nitrogen 28 mg. per 100 cc. The phthalein collected in one-half hour from the opposite kidney measured 20 per cent and the urea 15 gms. per liter. Nitrous oxid gas anesthesia was used and the nephrectomy was a particularly easy one. Following the operation the symptoms of uremia and acidosis, accompanied by anuria and acetonuria, gradually came on and, in spite of all the measures taken to combat them, the patient succumbed at the end of five days. Unfortunately an autopsy was refused. Squier reported a similar death, but in his case the acidosis and acetonuria followed the nephrectomy and was thought to be due to the chloroform anesthesia used.

Anuria—Anuria can be considered as a complication that can be prevented. It is our practice to force fluids for a number of days prior to the operation. On the preceding day at least three liters of water are given by mouth. If this has been overlooked the surgeon should at once postpone the operation. When necessary one liter of sodium bicarbonate and glucose is given by the Murphy drip following the operation. If this is not retained fluids are given by hyperdermoclysis

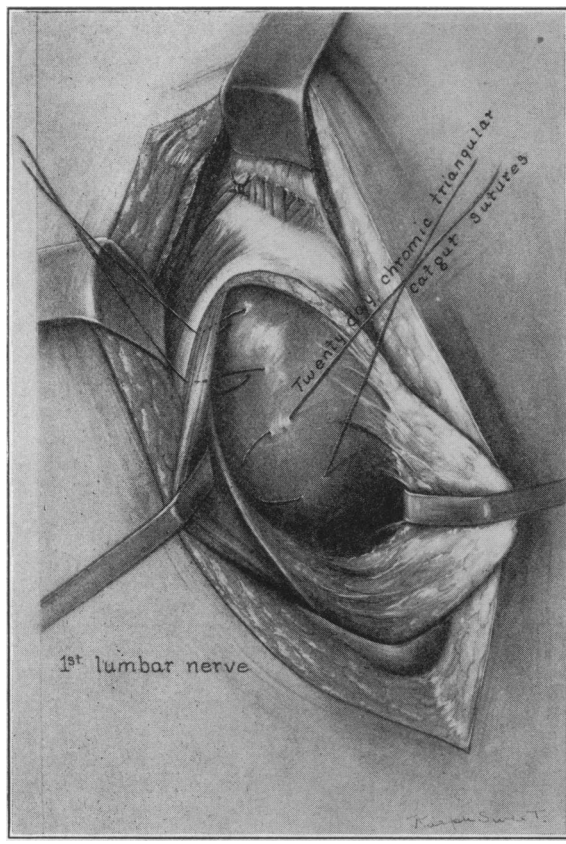

Plate III—In suspending the kidney above the twelfth rib and to the quadratus lumborum and in performing other operations, care is exercised not to injure the first lumbar nerve.

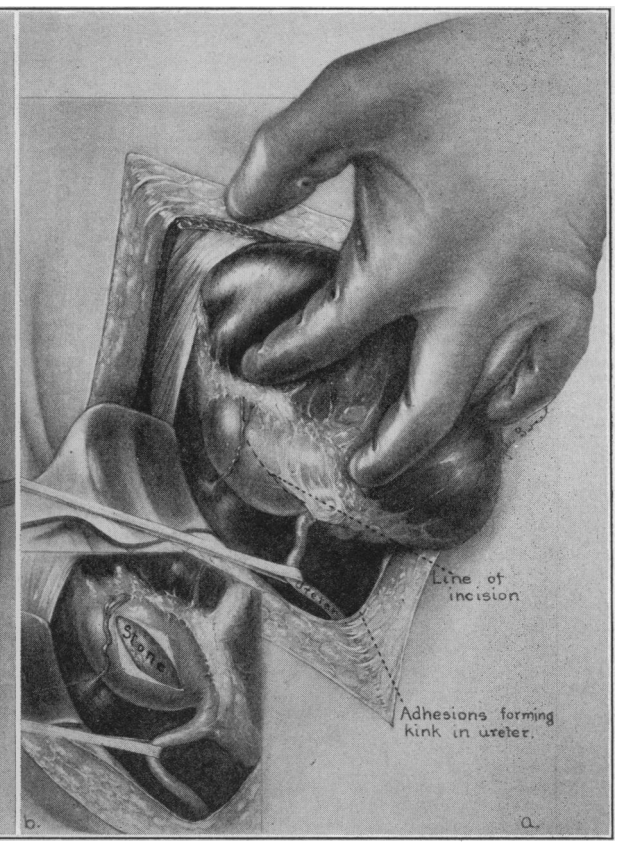

Plate IV—A. Line of incision in dorsal surface of the pelvis for the removal of stone or for plastic repair. Care is exercised not to injure retropelvic artery. B. Pelvis opened and large calculus exposed.

or by the intravenous route. The use of diuretin by mouth and novasural intravenously, although valuable adjuncts, should never replace the increased fluid intake. In order to avoid anuria it has been our practice in bilateral kidney lesions not to operate both kidneys on the same day, but to let two or three weeks intervene between the two operations. Great gentleness and care is exercised in handling the solitary kidney when it is attacked by surgery.

Cardiac Complications—The recognition of cardiac complications is very essential. In doubtful cases the heart should be thoroughly examined by a competent internist. Some cases can be made operable by placing them on digitalis prior to surgical intervention. In this way one builds up the reserve strength of the heart, enabling it to go through the operation. It is our practice to give fifteen drops of digalin hypodermically every four hours after the operation until the pulse reaches 70, at which time it is discontinued. On a number of patients this routine practice was omitted, but these did not appear to do so well. The use of digitalis not only assures the patient of reserve strength of his heart, but acts as a diuretic as well. In a written communication Dr. Harry Spiro states, "I agree that digitalis given under the above regimen is corrective and may be life saving. Oftentimes one cannot tell the exact condition of the heart and the conservative use of digitalis will strengthen the heart action. In cases of angina pectoris I do not use digitalis. Here a few extra days' rest in bed prepares the heart for the operation."

Local novocain anesthesia of the paravertebral type introduced by Lowsley of New York and localized allocain spinal anesthesia as used by Doctor Maisonnet, head urologist of the French army, at the Val de Grâce Hospital in Paris, recently introduced by the author into this country, are considered to have a decided advantage over general anesthesia in bad cardiac risks. Unfortunately local anesthesia cannot be used on nervous patients. We have found gas and oxygen anesthesia properly given without ether very satisfactory even in fairly bad cardiac cases. Patients presenting well-advanced myocarditis and aortic lesions are particularly bad risks.

Infrequency of Peritonitis—Although the peritoneum was opened on five occasions no symptoms of toxic peritonitis ensued. Operation on the kidney can be made entirely extraperitoneal if a reasonable amount of care is exercised by the surgeon. It is no longer necessary to employ the transperitoneal route even for removal of large kidneys. The anterior abdominal approach when necessary can be made entirely retroperitoneal. The recent thoraco-abdominal incision devised by Fey in Legueu's clinic gives one a particularly easy extraperitoneal approach to the high adherent left kidney with a short pedicle. In clamping the renal pedicle care should be exercised not to include the colon or duodenum, by carefully peeling away the adherent intestines from the pedicle.

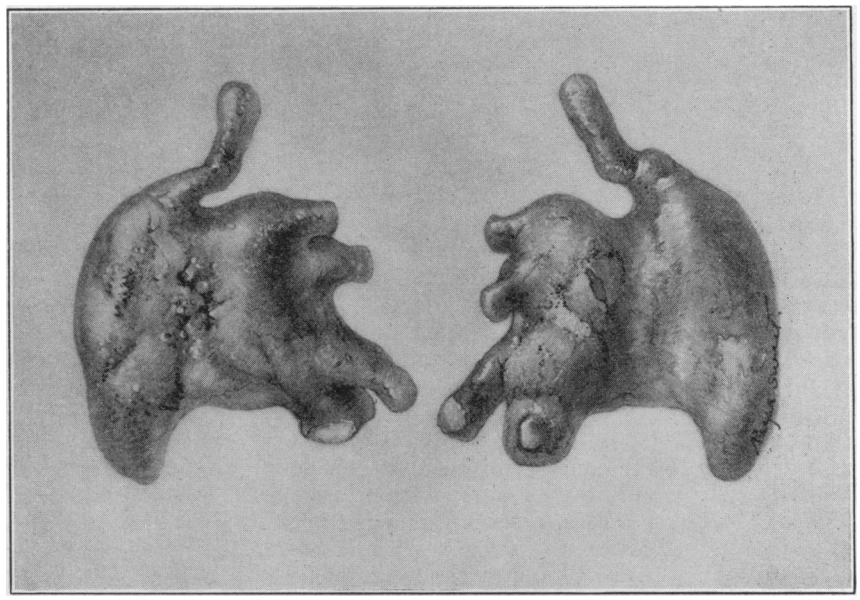

Plate V—Irregular stag-horn calculus removed through pyelotomy incision. Actual size.

Respiratory Complications — Respiratory complications are not uncommon. One should be on guard for pneumonia in those patients prone to pulmonary infection. The common cold should be entirely cleared up before attempting surgical intervention. The patient should not be subjected to drafts in the operating room and care should be exercised not to allow him to become chilled on his trip through the halls to and from the operating room. In order to lower pulmonary complications gas and oxygen anesthesia is used as a routine. Local paravertebral or localized spinal anesthesia is particularly indicated in pulmonary cases. In dissecting out large adherent tumors care must be exercised not to injure the pleura. Though this has occurred in a number of instances according to Papin, the only results are a low-grade pleurisy which usually clears up in the course of a week or two. Mayo is of the opinion that accidental opening of the pleura in which even the lung is easily seen does not result in pneumothorax or any other ill effect if the patient is lying face downward during the operation. Following all operations a pneumonia jacket is applied and the chest thoroughly rubbed with camphorated oil. Heliotherapy exposures of the kidney incision should be increased gradually, beginning with twenty minutes.

PREOPERATIVE PREPARATION AND OPERATIVE TECHNIQUE

The value of preparation in kidney operations as recently emphasized by Bugbee, Cunningham and others, does much to lower the mortality. In the fifty cases operated between 1906 and 1916, during which time the steps for correct diagnosis and preliminary preparation were not so complete as those taken later, the mortality was 6 per cent. Between 1916 and 1926 the mortality was 2.04 per cent in 320 cases. Death resulted from renal insufficiency in two cases; anuria, two; pneumonia, one; septicemia, one; and failure of function in two cases of extreme nephritis in which decapsulation was resorted to as a last measure. A careful estimation of renal function and study of the working power of the opposite kidney eliminates the poor risk. Let me emphasize that careful preparation of the patient and painstaking postoperative care does as much to lower the mortality as operative skill and quick judgment at operation.

A number of pitfalls associated with technique can be avoided by exercising gentleness in renal surgery. As pointed out by Clark, the cutting, tearing, prying, delving and hard retracting surgeon not only traumatises the tissues but lowers the tissue resistance, thereby breaking down nature's defensive mechanism against infection. A wide incision and a careful dissection of the kidney from the pleura, liver, peritoneum and viscera does much to lessen this injury. Whenever the pleura or peritoneum is accidentally opened, the surrounding field should at once be carefully packed away and the opening tightly closed by suture. In freeing the kidney from the peritoneum, which is in apposition to the prerenal fascia, blunt dissection should be employed. The kidney usually can be readily freed under direct vision. In exposing the upper and lower pole, one should search carefully for aberrant, anomalous arteries and excise them when necessary. A wide crescentic incision beginning at the point of the articulation of the last rib and the vertebrae, and extending well anterior to the anterior superior spine, gives sufficient exposure of the pedicle even in cases in which this is short and the kidney is high and is entirely behind the peritoneum throughout. Incision of the costovertebral ligament permits retraction of the ribs upward allowing greater exposure. We have found it necessary to resect the last rib on two occasions in which a stone was removed from the upper pole of the remaining kidney. The rib was excised in order not to deliver the kidney into the incision. The position of the patient can appreciably increase the space between the last rib and the crest of the ileum. This can be further increased by the use of a special stabilizer which raises the lumbar region from below, firmly keeps the under leg flexed and the upper leg extended and causes counterpressure on the abdomen from below. The high, left adherent kidney is best approached by the extraperitoneal abdominothoracic incision devised by Fey at the Necker Hospital. In doing a nephrectomy the renal vessels are doubly ligated individually if possible. If they cannot be separated the pedicle is doubly clamped en masse.

A ligature is tied above and below the clamp and the clamps released during the tightening of the ligature. It is best to spend a little time and be sure of the integrity of the renal pedicle. In no case was the vena cava injured.

POSTOPERATIVE CARE

Postoperative gas, while very annoying to the patient, has never caused a fatality. It is best treated by hypodermic injection of 1 cc. of pituitrin followed in one-half hour by a quinin and dilute hydrochloric acid gas enema and by the insertion of a rectal tube. Hot turpentine stupes are employed as a valuable routine aid. Dilatation of the stomach and excessive vomiting can be controlled by gastric lavage repeated when necessary.

I have come to the conclusion that it is best to drain regularly even if there is no infection in the kidney. A number of the cases which were not drained developed abscesses that subsequently required opening. A soft rubber tissue drain is placed in approximation to the posterior surface of the pelvis or kidney and is brought out through the upper end of the skin incision. If the perirenal tissues are greatly infected a similar drain is also brought out at its lower end. If there is extravasation of urine a number of drains should be used. The drain is daily gradually withdrawn so that it is entirely removed at the end of one week. No permanent fistulae have resulted with this procedure.

ELIMINATION OF CAUSES OF STASIS

Any cause of back pressure in the lower ureter prior or at the time of the conservative kidney operation should be removed. Strictures should be dilated, stones should be removed, and any cause of extra-ureteral pressure eliminated. Neglect of the relief of back pressure from below has unquestionably often been the cause of permanent fistulae formation following the operation on the kidney above. In removing calculi from the kidney any cause of stasis should be corrected. A low ptosed kidney should be suspended. Aberrant vessels pressing on the ureter and causing back pressure should be ligated and the narrowed point in the ureter should be widened by a plastic operation. A longitudinal incision is made in the ureter at the point of angling. This is transformed into a transverse incision when it is closed by suture. In this manner the constricted portion of the ureter is widened. A number of these plastic operations have been done in cases in which the hydronephrosis was sufficient to produce marked symptoms without serious impairment of renal function. In border-line cases with reduced function surgical judgment alone can decide between a conservative plastic operation and nephrectomy. I was obliged later to remove four kidneys. Two badly infected ptosed kidneys failed to increase their function after surgical suspension, and two other kidneys from which stones were removed developed recurring trouble requiring nephrectomy.

CONCLUSIONS

1. Three hundred and seventy operated cases are reported, 293 of which were consecutively performed by the author at St. Mary's Hospital with a mortality of 2.04 per cent.

2. The choice of the anesthesia, careful preparation and painstaking postoperative care does as much to lower the operative mortality and the number of complications as operative skill and judgment at the time of operation.

3. Many pitfalls and complications can be eliminated by improvement in technique. Rough handling of the tissues, excessive retraction and loss of blood should be avoided. Incision of the costovertebral ligament gives a wider field for operation and helps the operator recognize anomalous vessels and preserve the integrity of the ureter and surrounding structures.

4. The success of conservative renal surgery depends upon the elimination of stasis, which is accomplished by maintaining or establishing the proper outflow of urine.

760 Market Street.

TABLE I

CLASSIFICATION OF OPERATIONS

Nephrectomy:	
(a) Tuberculosis	32
(b) Hydronephrosis	16
(c) Renal tumor	11
(d) Adrenal tumor	1
(e) Pyonephrosis	33
(f) (Pyohydronephrosis with stone	19
(g) Traumatic rupture	5
(h) Carbuncle of kidney	2
Partial nephrectomy	3
Nephropexy for ptosis and painful hydronephrosis of small size:	
(a) Triangular catgut method	115
(b) Fascial operation with decapsulation	40
(c) With ligation of aberrant vessel	11
(d) With uteroplasty	7
Nephrolithotomy	23
Nephrotomy	5
Decapsulation	3
Pyelotomy	22
Drainage of kidney abscess	3
Drainage of perinephritic abscess	15
Resection of solitary cyst	2
Exploratory operation and inoperable condition found	2
Total	370

TABLE II

OCCURRENCE OF OPERATIONS

Right kidney	202
Left kidney	138
Right and left kidney (fifteen patients)	30
Total	370
Operations on remaining kidney	5

TABLE III

INCIDENCE ACCORDING TO SEX

Females	210
Males	160
Total	370

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DISCUSSION

JAMES R. DILLON, M. D. (490 Post Street, San Francisco)—We are indebted to Doctor Mathé for his very excellent presentation of his experiences in renal surgery. I do not agree entirely with his idea against incision and excision of renal abscesses and so-called carbuncle of the kidney, except when the kidney can be removed entirely without rupturing it. When pyelograms have been obtained and the site of the kidney lesion located, it has been my practice to explore that region first, and if the kidney capsule is strong enough to strip its perirenal tissues to continue the nephrectomy, but if ruptured and the nephrectomy incision becomes contaminated with acute inflammatory products, it has seemed safer to me to remove as much necrotic tissue as possible, put in drainage tubes, pack to control bleeding if necessary, and not expose any more fresh structures. After five to ten days we find the kidney has shriveled in size, the patient's resistance and immunity increased and the nephrectomy can be done without further complications.

Convalescence can be shortened in tuberculous nephrectomies by doing a ureterectomy in those patients having thickened indurated ureters. The nephrectomy is done through the usual lumbar incision, the patient is then put in the dorsal position and the ureter removed down to the bladder through a rectus incision. I have not felt the risk was materially increased and have not had any case take more than four weeks to heal completely.

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FRANK HINMAN, M. D. (384 Post Street, San Francisco)—Doctor Mathé has given a very instructive and interesting summary of his experiences in renal surgery. The showing of 2 per cent mortality is an excellent one. In analyzing the classification of conditions treated, one is somewhat surprised at the number of nephropexies performed—183. I do not feel so confident as to the safety of leaving clamps in place in nephrectomy as he has done six times in 119 nephrectomies with good results in each case. Reviewing the experiences of others in the literature, there has been a rather high proportion of fatal postoperative hemorrhages following release of the clamps, and I personally feel that clamps should never be left on except in the most extreme emergency condition. We have not left clamps on for ten years. His emphasis on the importance of fluids in all kidney surgery before operation bears out the experiences of others in this field. Water is an excellent diuretic and does not entail extra work, so far as renal tissue is concerned. We make it a routine to give hypodermoclysis during the operation so as to supply plenty of fluids without inconveniencing the patient after he awakens from the anesthetic.

One of the most serious complications to all kidney work that does not seem to be sufficiently emphasized is that of infection. It is probable that a large proportion of the failures in both conservative and radical surgery on the kidney are due to secondary infections. These infections, as has been well emphasized, are produced or made serious by rough and prolonged surgery. Dispatch at the time of operation is one of the greatest assets of successful renal surgery and, of course, by dispatch one does not mean undue haste, but that everything move smoothly and with a certain amount of speed. An unfortunate example in our own experience very well illustrates this point. It was in the case of pelvic stone that acted in a ball-valve manner at the ureteropelvic juncture in a solitary kidney of a man of 65. At the time of operation there was no particular difficulty other than after opening the pelvis the stone had slipped up into one of the minor calyces and was not found until some time had been lost in searching. The operation took about one hour and a half and should have been completed in less than one hour. The stone was finally found and removed. The kidney functioned, but the patient developed a very severe infection of the kidney and wound which proved to be a gas bacillus infection of which he died four days after operation. Autopsy was performed and it was found that the gas bacillus had invaded the perirenal tissues and the muscles of the back in the neighborhood in a very extensive manner. Serum treatment and radical resection of the involved areas before death had given no benefit. The case exemplifies the severe type of infection that may follow kidney operations; an infection which undoubtedly came from the intestinal tract, an infection which was secondary to trauma to tissues and which most probably would not have occurred had the stone been immediately found and removed, the operation shortened and the retraction and trauma reduced. This experience has taught us the advisability of always having available in stone cases an x-ray operator who can take pictures after the method of Quimby or can fluoroscope the kidney at the time of operation as is the custom at the Mayo Clinic. It affords considerable gratification also to have the word of such an x-ray expert that there are no shadows left after stones that have been shown by x-ray have presumably been removed.

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GUY MANSON, M. D. (1020 Mattei Building, Fresno)—I wish to express my appreciation of the privilege of discussing Doctor Mathé's valuable paper. There are many lessons to be learned in reviewing the surgical cases of a man of Doctor Mathé's experience. I am inclined to agree with Doctor Hinman, that the leaving of clamps on the kidney pedicle is a much more serious procedure than one would infer from Doctor Mathé's paper. I have never had the courage to do so, although I can easily see that emergencies may arise that would make it absolutely necessary. When clamps are left on they should be removed with the greatest care, loosening the clamp a notch or two each day, for one or two days before complete removal. Too rapid or rough removal of a clamp may open up a vessel and start fresh bleeding.

In tuberculous kidneys I believe the perirenal fat is involved more often than we suspect. I believe it is important to remove as much of this tissue as possible. I have not been in the habit of removing the ureter, but I have lately adopted the procedure of bringing the ureter out and suturing it to the skin at the lower angle of the wound, much as we treat the vas in our tuberculous epidimitis. I have not had a large enough series of cases to pass any judgment on the value of this procedure. Since doing this I have not had a wound break down, and I have never seen any bad results from it.

Doctor Mathé mentions septicemia as a complication in renal surgery, but does not dwell much upon it in his discussion. Particularly in kidney stones, complicated with infection, should the danger of septicemia be emphasized. The greatest care should be taken to clear up the kidney infection and we should not be in too great a hurry to remove the stone. I recently lost a patient from septicemia, although we treated the infection in the kidney for two weeks after the fever had subsided and the urine was free from pus, before we removed the stone.

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Doctor Mathé (closing)—The constructive criticism of this paper brought forward in the discussion of Doctors Dillon, Hinman, and Manson, aids in the accomplishment of its purpose, which is improvement in technique, prevention of complications, and lowering of mortality.

Doctor Dillon suggests the advisability of performing a two-stage nephrectomy in those cases of renal abscess and carbuncle in which the tunica fibrosa is ruptured in the process of delivering the kidney and the perirenal tissues thereby infected. This is a wise procedure and should also be applied to cases complicated by perinephritic abscess. However, if there is no pre-existing infection of the perirenal tissues and, if at the time of operation they are carefully protected by gauze packing, it seems logical that the kidney may be removed without danger of infection. As Doctor Hinman emphasizes, infection is an important factor. Limitation of space did not permit me to dwell sufficiently upon it in this article.

There is no question but that rough handling of the kidney, severe retraction and undue loss of blood lowers the local resistance of the kidney, so favoring infection. In doing conservative operations on kidneys presenting pelvic infection, urinary antiseptics are given, pelvic lavage instituted and fluids forced in order to clear up or at least to minimize the amount of infection in the kidney at the time of operation. As emphasized by Doctor Manson this is an important factor in preventing septicemia which is more likely to occur, because of the greater vascularity, when the parenchyma rather than the pelvis is opened. Operations on the kidney can be performed quickly, but safety should have precedence over speed. Good exposure gained by a wide incision, division of the costovertebral ligament, and the proper posture of the patient, coupled with reasonable speed and good teamwork on the part of the assistants, will permit the average kidney operation to be performed in about an hour's time. The use of the fluoroscope at the time of operation will facilitate the search for stones by assuring the surgeon that they are all removed, and thus shorten the time of operation and eliminate the possibility of leaving fragments behind to act as nuclei for future stone formation.

The diversified opinion as to the treatment of the ureter in performing nephrectomy for tuberculosis is exemplified in the discussion of Doctors Manson and Dillon. Doctor Manson never had a tuberculous wound break down after removing the perirenal fat and bringing out and suturing the ureter to the lower end of the skin incision, whereas Doctor Dillon obtains complete closure in four weeks by removing the ureter also. Although I always attempt to remove the perirenal fat, and I have treated the ureter by both of the above methods, nevertheless 13 per cent broke down. Based upon a review of the literature this seems to agree with the experience of most surgeons. At the recent meeting of the western branch of the American Urological Association held in Seattle on July 6, 1927, B. Scholefield reviewed the causation of persistent sinuses and delayed healing of tuberculous nephrectomy wounds in eighty consecutive cases at the Peter Bent Brigham Hospital. His complete review of the literature and detailed study of these cases prove that a certain percentage of wounds break down, no matter what disposition is made of the ureter; sinuses are often due to a tuberculous infection of the granulation tissue that forms in the process of healing. In some cases these are cured by exposure to the sun rays; in others closure of the wound can only be accomplished by clean complete removal of the infected granulation tissue.

There is no question that there is considerable danger of hemorrhage in releasing clamps that have been left on the renal pedicle in performing nephrectomy. Certain extreme emergency conditions consisting of pre-existing shock due to the loss of blood from kidney rupture and that type of shock that sometimes suddenly occurs while removing extremely enlarged kidneys warrants its occasional use. In the six cases in which we left them in place, we felt that the danger of subsequent hemorrhage was far outweighed by the danger of death from shock. It is well to wait eighty-two or ninety-six hours and not twenty-four hours before removing the clamp. The clamp is carefully loosened notch by notch and left in apposition to the pedicle for an hour. If no hemorrhage occurs, sterile olive oil is poured into the wound in order to assure lubrication and the clamp carefully removed.

I wish to thank Doctors Dillon, Hinman, and Manson for describing some of their experiences with the complications of renal surgery. These statistics, added to the aggregate of those of other urologists throughout the country, should help lower the mortality, reduce the complications, and improve the technique of renal surgery.

SENSITIZATION PHENOMENA IN DERMATOLOGY

By H. J. Templeton, M. D.
Oakland

Discussion *by Charle E. Schoff, M.D., Sacramento; C. G. Stigall, M.D., San Diego; Douglass W. Montgomery, M.D., San Francisco; Albert H. Rowe, M.D., Oakland.*

IN discussing sensitization phenomena in dermatology I would rather do so under the broad term "hypersusceptibility" than to confine my remarks to the narrower term "anaphylaxis." For in sensitization we see two types of reactions. First, true anaphylaxis due to sensitization to some definite protein; and second, a hypersensitization to agents of varying chemical composition and which cannot, strictly speaking, be classed as true instances of *protein* sensitization. Under the heading of anaphylaxis would come the urticarias, etc., due to sensitization to some definite food, such as crab, while under the second heading mentioned above would come such cases as extreme sensitization to paraphenylendiamin used in dyeing fur neck pieces.

We may also divide the agents to which the skin may become sensitive into those with which it comes into contact from without and those acting upon it from within the body. This is the most practical way to approach the subject.

EXTERNAL AGENTS

Most of the dermatoses produced by contact with external agents are of the dermatitis venenata type and can roughly be quickly differen-